

Single-Aperture GPS-based Attitude (GPS/A) Sensor for Spin-Stabilized Platforms, Phase II

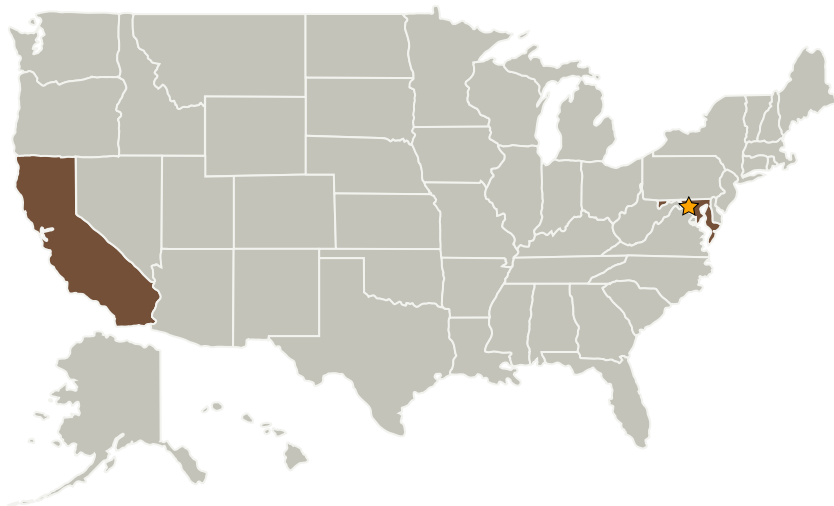
Completed Technology Project (2009 - 2011)



Project Introduction

Attitude determination of spin-stabilized platforms is especially challenging. Current low-cost gyroscope technology does not lend itself to attitude determination of platforms spinning in excess of one rotation per second. Traditional GPS-based attitude (GPS/A) sensors require three or more antenna elements separated by large baselines. Single-element designs require extensive calibration of the satellite signal-to-noise ratio (SNR) and are not very accurate. Toyon Research Corporation proposes to develop a small, single-aperture low-cost GPS/A sensor for space launch vehicles, and to demonstrate the sensor in an operational environment. The sensor determines the platform attitude with a single GPS antenna having a diameter of approximately 6.5 cm. The standalone performance of Toyon's GPS/A sensor on a spinning platform is better than 2.1 degrees for roll, and better than 1.2 degrees for yaw and pitch (one-sigma). The system performance can be further improved when integrated with accelerometers and/or magnetometers. Although current low-cost gyroscope technology does not allow their use on spinning platforms, non-spinning platforms may take advantage of gyro measurements for further improvements in attitude performance. During the proposed Phase II program Toyon will develop, build and test a prototype system that will be delivered for validation onboard an actual space launch vehicle.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Toyon Research Corporation	Supporting Organization	Industry	Goleta, California

Primary U.S. Work Locations	
California	Maryland

Project Transitions

**April 2009:** Project Start**September 2011:** Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
 - └ TX17.4 Attitude Estimation Technologies
 - └ TX17.4.3 Attitude Estimation Sensors